



**MATERIAL SPECIFICATION FOR
GABION BASKETS, MATS, AND MATTRESSES**

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1430.01 SCOPE

This specification covers the requirements for gabion baskets, mats and mattresses and related accessories.

1430.01.01 Specification Significance and Use

This specification is written as a municipal-oriented specification. Municipal-oriented specifications are developed to reflect the administration, testing, and payment policies, procedures, and practices of many municipalities in Ontario.

Use of this specification or any other specification shall be according to the Contract Documents.

1430.01.02 Appendices Significance and Use

Appendices are not for use in provincial contracts as they are developed for municipal use, and then, only when invoked by the Owner.

Appendices are developed for the Owner's use only.

Inclusion of an appendix as part of the Contract Documents is solely at the discretion of the Owner. Appendices are not a mandatory part of this specification and only become part of the Contract Documents as the Owner invokes them.

Invoking a particular appendix does not obligate an Owner to use all available appendices. Only invoked appendices form part of the Contract Documents.

The decision to use any appendix is determined by an Owner after considering their contract requirements and their administrative, payment, and testing procedures, policies, and practices. Depending on these considerations, an Owner may not wish to invoke some or any of the available appendices.

1430.02 REFERENCES

When the Contract Documents indicate that municipal-oriented specifications are to be used and there is a municipal-oriented specification of the same number as those listed below, references within this specification to an OPSS shall be deemed to mean OPSS.MUNI, unless use of a provincial-oriented specification is specified in the Contract Documents. When there is not a corresponding municipal-oriented specification, the references below shall be considered to be the OPSS listed, unless use of a provincial-oriented specification is specified in the Contract Documents.

This specification refers to the following standards, specifications, or publications:

ASTM International

A90/A90M-21	Standard Test Method for Weight (Mass) of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
A313/A313M-18	Standard Specification for Stainless Steel Spring Wire
A370-23	Standard Test Methods and Definitions for Mechanical Testing of Steel Products
A641/A641M-19	Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
A764-07(2021)	Metallic Coated Carbon Steel Wire, Coated at Size and Drawn to Size for Mechanical Springs
A975-23	Standard Specification for Double-Twisted Hexagonal Mesh Gabions and Revet Mattresses (Metallic-Coated Steel Wire or Metallic-Coated Steel Wire with Poly (Vinyl Chloride) (PVC) Coating)

Underwriters Laboratories

746B-18	Polymeric Materials - Long-Term Property Evaluations
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1430.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Gabions means a gabion basket, a gabion mat or a gabion mattress filled with gabion stones.

Gabion Baskets means rectangular containers made of double twisted steel wire mesh produced to the dimensions shown in Table 1.

Gabion Mats means rectangular containers made of double twisted steel wire mesh produced to the dimensions shown in Table 2.

Gabion Mattresses means rectangular containers made of double twisted steel wire mesh produced to the dimensions shown in Table 3.

Lacing Wire means a galvanized steel wire or galvanized steel wire with polyvinylchloride (PVC) or high density polyethylene (HDPE) based polymer coating used to assemble and interconnect gabion basket, gabion mat or gabion mattress containers and to close and secure stone filled containers.

1430.05 MATERIALS

1430.05.01 Fasteners

1430.05.01.01 General

Fasteners shall be fabricated such that when the ends of the fastener are brought together and properly locked, the fastener forms a closed loop. The inside area of the closed loop shall be at least 325 mm² to enclose up to four selvage wires.

Locked fasteners shall be able to resist a minimum direct force across any axis of 3 kN while remaining closed and locked.

1430.05.01.02 Interlocking Wire Fasteners

Interlocking fasteners shall be manufactured from 3 mm diameter steel mechanical spring wire Class 1, Finish 2, Type B, Tensile Class 2, according to ASTM A764.

1430.05.01.03 Stainless Steel Rings

Stainless steel ring shall be manufactured from 3 mm diameter stainless steel spring wire Type 302, Class 1, according to ASTM A313M.

1430.05.02 Gabion Baskets, Gabion Mats, and Gabion Mattresses

1430.05.02.01 General

Gabion baskets shall be manufactured from galvanized steel wire mesh or PVC or HDPE based polymer coated galvanized steel wire mesh as specified in the Contract Documents. When the type of mesh is not specified in the Contract Documents, the gabion baskets shall be manufactured from PVC or HDPE based polymer coated galvanized steel wire mesh.

Gabion mats and gabion mattresses shall be manufactured from PVC or HDPE based polymer coated galvanized steel wire mesh.

Gabion baskets and the base section of gabion mats and gabion mattresses shall have all components connected in such a manner that the strength at the point of connection meets the requirements of Table 4 as tested according to ASTM A 975, Section 13.1.

1430.05.02.02 Wire Mesh

The mesh shall be woven from wire using a double twist pattern to create uniform hexagonal openings of 83 x 114 mm for gabions baskets and gabion mats, 64 x 83 mm for gabion mattresses. The wire mesh shall be non-ravelling and shall provide the strength listed in Table 4 as tested according to ASTM A975, Section 13.1.

The perimeter edges of the wire mesh shall be woven around a selvage wire in a manner designed to prevent slippage and to create a selvage.

1430.05.02.03 PVC or HDPE Based Polymer Coating

Coating shall meet or exceed ASTM A975 and shall have a minimum thickness of 0.38 mm with a nominal thickness of 0.50 mm. Prior to UV and abrasion degradation, the coating shall have a projected durability life of 60 years as tested according to UL 746B.

1430.05.02.04 Wire

The wire for wire mesh, selvage wire, lacing wire, and internal connections shall be galvanized wire, soft or medium temper, Class 3 coating, according to ASTM A641. The wire diameter shall be according to Table 5. The tensile strength of the wire shall be according to ASTM A641 as tested according to ASTM A370. Galvanizing on the wire shall meet the requirements of Table 5 as tested according to ASTM A90M.

1430.07 PRODUCTION

1430.07.01 General

Gabion baskets, gabion mats, and gabion mattresses shall be manufactured so that the sides, ends, lid, base, and diaphragms can be readily assembled into rectangular units.

Where the length of the gabion basket exceeds its horizontal width, the gabion basket shall be divided into equal cells by diaphragms. Cell length shall not exceed its horizontal width. Diaphragms shall be made of wire mesh and shall be secured in the proper position on the base section. Gabion mats shall have diaphragms spaced at 1.0 m across the width of the mat and maximum 3.0 m along the length of the mat. Gabion mattresses shall have diaphragms spaced at 1.0 m across the length of the mattress.

Gabion baskets, gabion mats or gabion mattresses shall be manufactured with all components connected at the production facility with the exception of the gabion mat and gabion mattress lid. Gabion baskets manufactured from galvanized wire mesh shall be assembled using either lacing wire or fasteners. Gabion baskets, gabion mats and gabion mattresses manufactured from PVC or HDPE based polymer coated galvanized wire mesh shall be assembled using stainless steel ring fasteners. Fasteners shall be installed at a maximum spacing of 150 mm with at least one fastener per gabion mesh opening.

1430.07.02 Dimensions and Tolerances

Gabion baskets, gabion mats, and gabion mattresses shall be produced to the sizes and dimensions shown in Tables 1, 2 and 3. All dimensions are subject to a tolerance limit of $\pm 5\%$, except depth dimensions, which are subject to tolerance limit of $\pm 5\%$ for gabion baskets and $\pm 10\%$ for gabion mats and gabion mattresses.

1430.07.03 Packaging and Marking

Each gabion basket, gabion mat and gabion mattress shall be clearly colour coded according to Tables 1, 2 and 3 or otherwise suitably identified to indicate its size.

Gabion baskets shall be shipped folded flat in bundles. Each bundle shall contain an equal number of one size of gabion baskets, except as necessary to complete an order. Each bundle shall be clearly marked to show the size and number of baskets it contains. The maximum weight of one bundle shall be 850 kg.

Gabion mats shall be shipped in rolls with ends, sides, and dividers attached to the base. The gabion mat lid and base units are to be shipped unattached but rolled together as one. The maximum weight of one roll shall be 850 kg.

Gabion mattresses shall be shipped folded flat in bundles. Each bundle shall contain an equal number of one size of gabion mattresses, except as necessary to complete an order. The gabion mattress lid and base units are to be shipped unattached in separate bundles. Each bundle shall be clearly marked to show the size and number of mattresses it contains. The maximum weight of one bundle shall be 850 kg.

1430.08 QUALITY ASSURANCE

1430.08.01 Inspection and Testing

The Owner reserves the right to make inspections and tests and at times the Owner may consider necessary to ensure that the materials supplied are according to this specification.

All materials failing to comply with the requirements of this specification shall be rejected.

1430.09 OWNER PURCHASE OF MATERIAL

1430.09.01 Measurement and Payment

Payment at the price specified in the purchasing order for the number of units of each type and size of gabion basket, gabion mat and gabion mattress shall be for the supply of the gabion baskets, gabion mats or gabion mattresses including the dividers, diaphragms, connecting wire, and lacing wire or fasteners, delivered to the destination on the date and time specified.

The cost of all testing, except that performed in the Owner's laboratory, shall be included in the price.

TABLE 1
Gabion Basket Sizes and Dimensions

Size Number	Number of Diaphragms	Approximate Dimensions and Volumes				Colour Code
		Length m	Width m	Depth m	Capacity m ³	
1	1	2.00	1.00	0.30	0.60	Blue/Red
2	1	2.00	1.00	0.50	1.00	Red
3	1	2.00	1.00	1.00	2.00	Blue
4	2	3.00	1.00	0.30	0.90	Blue/Yellow
5	2	3.00	1.00	0.50	1.50	Green
6	2	3.00	1.00	1.00	3.00	White
7	3	4.00	1.00	0.30	1.20	Blue/Green
8	3	4.00	1.00	0.50	2.00	Yellow
9	3	4.00	1.00	1.00	4.00	Black
10	1	2.00	0.50	0.50	0.50	White/Yellow
11	2	3.00	0.50	0.50	0.75	White/Green

TABLE 2
Gabion Mat Sizes and Dimensions

Size Number	Number of Dividers	Number of Diaphragms	Approximate Dimensions and Areas				Colour Code
			Length m	Width m	Depth m	Area m ²	
12	1	18	30	2	0.23	60	Black/Green
13	2	27	30	3	0.23	90	Black/Yellow
14	1	18	30	2	0.30	60	Black/Blue
15	2	27	30	3	0.30	90	Black/White

TABLE 3
Gabion Mattress Sizes and Dimensions

Size Number	Number of Diaphragms	Approximate Dimensions and Areas			
		Length m	Width m	Depth m	Area m ²
16	2	3	2	0.17	6
17	2	3	3	0.17	9
18	3	4	2	0.17	8
19	3	4	3	0.17	12
20	4	5	2	0.17	10
21	4	5	3	0.17	15
22	5	6	2	0.17	12
23	5	6	3	0.17	18
24	2	3	2	0.23	6
25	2	3	3	0.23	9
26	3	4	2	0.23	8
27	3	4	3	0.23	12
28	4	5	2	0.23	10
29	4	5	3	0.23	15
30	5	6	2	0.23	12
31	5	6	3	0.23	18
32	2	3	2	0.30	6
33	2	3	3	0.30	9
34	3	4	2	0.30	8
35	3	4	3	0.30	12
36	4	5	2	0.30	10
37	4	5	3	0.30	15
38	5	6	2	0.30	12
39	5	6	3	0.30	18

TABLE 4
Minimum Strength Requirements of Mesh and Connections

Test Description	Galvanized Gabion Basket	PVC or HDPE Based Polymer Coated		
		Gabion Basket	Gabion Mat	Gabion Mattress
Parallel to Twist	51.1 kN/m	42.3 kN/m	33.6 kN/m	33.6 kN/m
Perpendicular to Twist	26.3 kN/m	20.4 kN/m	13.1 kN/m	13.1 kN/m
Connection to Selvages	20.4 kN/m	17.5 kN/m	10.2 kN/m	10.2 kN/m
Panel to Panel Connection Using Lacing Wire or Fasteners	20.4 kN/m	17.5 kN/m	10.2 kN/m	10.2 kN/m
Punch Test	26.7 kN	23.5 kN	17.8 kN	17.8 kN

TABLE 5
Wire Requirements for Gabion Basket, Gabion Mats, and Gabion Mattresses

	Galvanized Gabion Basket	PVC or HDPE Based Polymer Coated		
		Gabion Basket	Gabion Mat	Gabion Mattress
Mesh Type	80 x 100 mm	80 x 100 mm	80 x 100 mm	60 x 80 mm
Mesh Opening	83 x 114 mm	83 x 114 mm	83 x 114 mm	64 x 83 mm
Wire Diameter for Mesh	3.05 mm	2.70 mm	2.20 mm	2.20 mm
Wire Diameter for Selvages and Corners	3.90 mm	3.40 mm	2.70 mm	2.70 mm
Wire Diameter for Lacing and Internal Connections	2.20 mm	2.20 mm	2.20 mm	2.20 mm
Galvanizing for Mesh Wire	259 g/m ² min	244 g/m ² min	214 g/m ² min	214 g/m ² min
Galvanizing for Selvage Wire	275 g/m ² min	259 g/m ² min	244 g/m ² min	244 g/m ² min
Galvanizing for Lacing Wire	214 g/m ² min	214 g/m ² min	214 g/m ² min	214 g/m ² min

**Appendix 1430-A, November 2023
FOR USE WHILE DESIGNING MUNICIPAL CONTRACTS**

Note: This is a non-mandatory Commentary Appendix intended to provide information to a designer, during the design stage of a contract, on the use of the OPS specification in a municipal contract. This appendix does not form part of the standard specification. Actions and considerations discussed in this appendix are for information purposes only and do not supersede an Owner's design decisions and methodology.

Designer Action/Considerations

The designer should determine which type of mesh is to be used for the gabion baskets and specify it in the Contract Documents. PVC or HDPE based polymer coated gabion baskets are recommended in aggressive environment where road salt may be present and in aquatic and marine applications. (1430.05.01)

The designer should ensure that the General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

No information provided here.